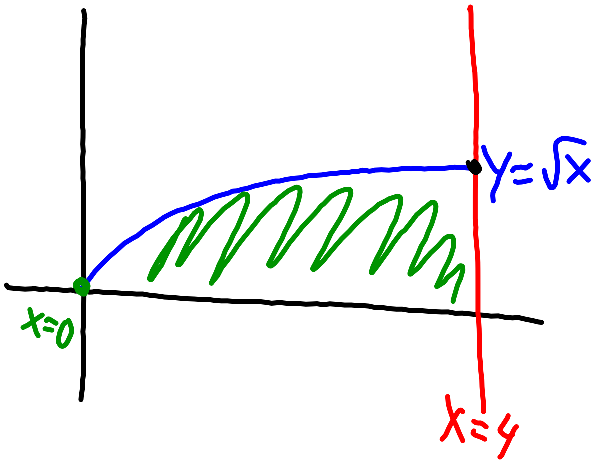
5/19/17 "There is no traffic on the extra mile".

- Anonymous

Final on Wednesday 6/7

AIM: How do we find volume?

1) Find the area of the region "R" bounded by $y=\sqrt{x}$, $y=0$, and $x=4$.



Top - bottom

$$Area=\int_0^4 (\sqrt{x}-0)\,dx$$

$$=\int_0^4 \sqrt{x}\,dx$$

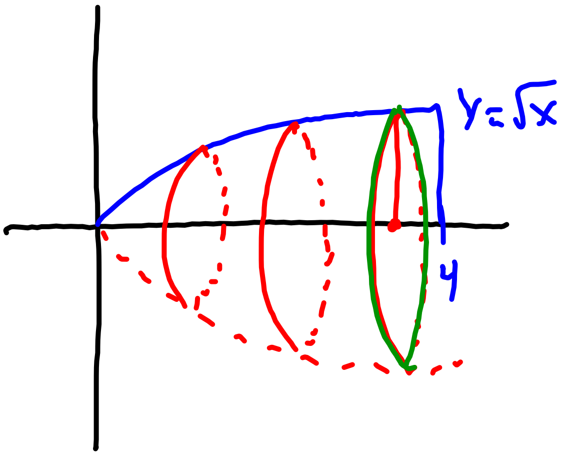
$$=\int_0^4 x^{1/2}\,dx$$

$$=\frac{2}{3}x^{3/2}\Big]_0^4$$

$$=\frac{2}{3}(4)^{3/2}-\frac{2}{3}(0)^{3/2}$$

$$=\boxed{\frac{16}{3}}$$

2) If we rotate "R" about the x-axis. Find the volume of the resulting solid.



each slice is a circle

Area of circle $= \pi r^2$

$r = \sqrt{x}$

area of each cross section $= \pi(\sqrt{x})^2$

Volume $= \int$ cross sectional area.

$$\text{Volume} = \int_0^4 \pi(\sqrt{x})^2\,dx$$

$$\text{Volume} = \pi\int_0^4 (\sqrt{x})^2\,dx$$

$$= \pi(8)$$

$$\boxed{V = 8\pi \text{ units}^3}$$

$f(x) = 7x^6$

$f'(x) = 42x^5$

$y = 7x^6$

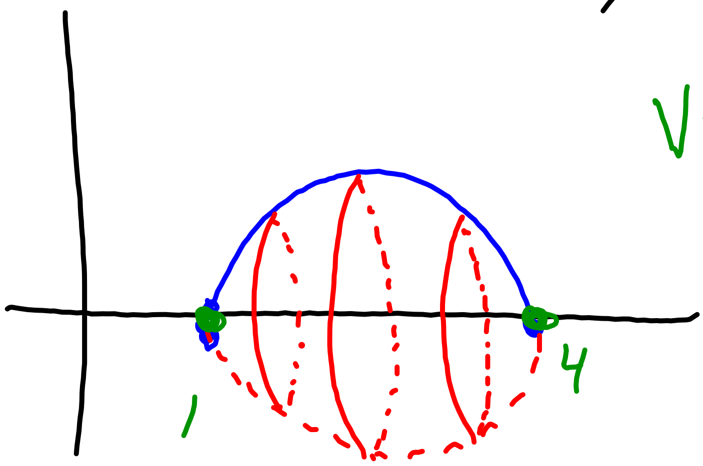
$7 \cdot 6x^5$

$42x^5$

3) $f(x) = -x^2 + 5x - 4$

Let "R" be the region in the 1^{st} quadrant between $f(x)$ and the x-axis.

What is the Volume of the solid formed by rotating "R" about the x-axis?



$$V = \pi \int_a^b (f(x))^2 \, dx$$

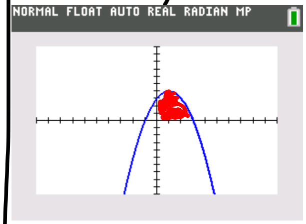
$$V = \pi \int_1^4 (-x^2 + 5x - 4)^2 \, dx$$

$$V = \pi (8.1)$$

$$\boxed{V = 8.1\pi} \; \boxed{\text{units}^3}$$

4) Let R be the region in Q1 bounded by $y=3+2x-x^2$, $y=0$ and $x=0$

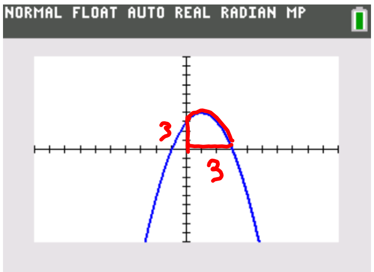
a) Find the Area of R.



$$\text{Area} = \int_0^3 (3+2x-x^2-0)\,dx$$

$$\text{Area} = 9 \text{ units}^2$$

b) Find the Perimeter of "R"



$$P = 3+3+\int_0^3 \sqrt{1+(y')^2}\,dx$$

$$P = 3+3+\int_0^3 \sqrt{1+(2-2x)^2}\,dx$$

$$y = 3+2x-x^2$$

$$y' = 2-2x$$

NORMAL FLOAT AUTO REAL RADIAN MP

$3+3+\int_0^3 \left(\sqrt{1+(2-2X)^2}\right)dX$

12.12572662

$$\boxed{P = 12.126 \text{ units}}$$

c) Find the volume of the solid generated by rotating R about the x-axis.

$$V = \pi \int_0^3 (3+2x-x^2)^2\,dx$$

NORMAL FLOAT AUTO REAL RADIAN MP

$\int_0^3 \left((3+2X-X^2)^2\right)dX$

30.6

$$\boxed{V = 30.6\pi \text{ units}^3}$$